

# The Formation of Economic Preferences

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Alexander Bertermann (ifo Munich)

Laura Breitkopf (MPI Bonn)

[Shyamal Chowdhury](#) (ANU Canberra)

Hannah Schildberg-Hörisch (U Düsseldorf, MPI Bonn)

Matthias Sutter (MPI Bonn, U Cologne, U Innsbruck)

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Graduate School of Economics

The University of Tokyo

# Motivation

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Economic preferences—time, risk, and social—are essential building blocks of many economic models and determine large sets of behaviors and outcomes in (adult) life:

- Social preferences: Cooperative behaviors at the workplace, donations, public good provision, and repayment of loans
- Risk preferences: Health outcomes, investment decisions, and addictive behaviors
- Time preferences: Criminal behaviors, educational attainment, health, and labor market success

Similar patterns observed for **children** (e.g., Castillo et al. 2011, 2018, 2019, Sutter et al. 2013).

- Associations persist: Measures of economic preferences in childhood also predict adult outcomes (e.g., Borghans et al. 2008, Golsteyn et al. 2014)

Therefore, it is important to better understand **preference formation in childhood and adolescence**. We think of it in the framework of a skill formation process.

## Seminal model of skill formation in economics (Cunha and Heckman 2007)

Skill formation during childhood as **dynamic, multistage process** where skills change over time as result of accumulating investments.

**Technology of skill formation:**

$$\theta_{t+1} = f_t(\theta_t, \sigma_p, \sigma_{sib}, I_t, S_t, \eta)$$

where

- $\theta_{t+1}$  represents a child's economic preferences (e.g., social, risk, and time preferences) at stage  $t + 1$
- **Self-productivity and cross-fertilization:**  $\theta_t$  is the vector of preference stocks at stage  $t$
- **Role of family members:**  $\sigma_p$  and  $\sigma_{sib}$  are parents' and siblings' economic preferences
- **Parental investments**  $I_t$  occur between the realizations of  $\theta_t$  and  $\theta_{t+1}$
- **Shocks** (negative investments)  $S_t$  occur between the realizations of  $\theta_t$  and  $\theta_{t+1}$
- $\eta$  captures unobserved inputs affecting the formation of preferences

Use **unique panel data on economic preferences of children and adolescents** from 3,800 households to comprehensively study preference formation before onset of adulthood.

- Previous evidence on formation of children's preferences typically based on cross-sectional data: not possible to study dynamic, within-individual development over time (exceptions Kosse et al. 2021 or Castillo et al. 2025)
- Comprehensive empirical evidence on sources of heterogeneity in dynamic preference trajectories, building on model of skill formation (Cunha and Heckman 2007) within single setup:
  - First evidence on self-productivity and cross-fertilization of preferences
  - Role of family members
  - Role of parental investments and exogenous shocks

### Four waves of panel data on children's social, risk, and time preferences.

- Children's **age range: 7-18**
- Tracking more than 4,500 children from almost 3,800 households
- Same incentivized preference measures for whole families
- Rich data on parental investments and shocks
- Random selection of 150 villages in four districts of rural Bangladesh, random sampling of households within villages
- Interviews, incentivized experiments, and IQ tests conducted at the families' homes by local survey firm

**Table:** Numbers of observations

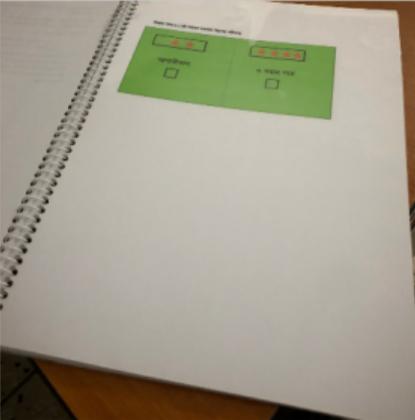
<b>Panel A: by age group</b>			
Age interval	Frequency	Percent	Cum.
7-8	1,586	8.61	8.61
9-10	3,195	17.35	25.96
11-12	4,214	22.88	48.84
13-14	4,363	23.69	72.53
15-16	3,603	19.56	92.09
17-18	1,456	7.91	100.00
<b>Total</b>	<b>18,417</b>	<b>100.00</b>	

<b>Panel B: by survey wave</b>			
Wave	Frequency	Percent	Cum.
(1) 2018	4,511	24.49	24.49
(2) 2019	4,762	25.86	50.35
(3) 2020	4,703	25.54	75.89
(4) 2022	4,441	24.11	100.00
<b>Total</b>	<b>18,417</b>	<b>100.00</b>	

NOTES: Frequency distributions

# Setting



## Social preferences experiment

Experiment to elicit social preferences with dictator games (Fehr et al. 2008, Bauer et al. 2014):

<b>Costly prosocial game</b>	1 star for me 1 star for the other child (1,1)	vs.	2 stars for me 0 stars for the other child (2,0)
<b>Costless prosocial game</b>	1 star for me 1 star for the other child (1,1)	vs.	1 star for me 0 stars for the other child (1,0)
<b>Costless envy game</b>	1 star for me 1 star for the other child (1,1)	vs.	1 star for me 2 stars for the other child (1,2)
<b>Costly envy game</b>	1 star for me 1 star for the other child (1,1)	vs.	2 stars for me 3 stars for the other child (2,3)

Stars: experimental currency, like money

Collapse into **single prosociality measure**:

calculate share of stars given to the other child as  $\frac{\# \text{ stars given to other child}}{\# \text{ stars given and kept}}$  over all four games

## Risk preferences experiment

Experiment to elicit risk preferences with lottery choices (Binswanger 1980, Bauer et al. 2012):

	Low amount (50% chance)	High amount (50% chance)	
<b>Gamble 1</b>	25	25	} <i>risk-averse</i>
<b>Gamble 2</b>	22	48	
<b>Gamble 3</b>	20	60	
<b>Gamble 4</b>	15	75	
<b>Gamble 5</b>	5	95	} <i>risk-neutral</i>
<b>Gamble 6</b>	0	100	} <i>risk-seeking</i>

Lotteries for ages 10-11, with payoffs in Taka

- **Risk attitude**: higher gamble numbers (between 1-6) are associated with a higher willingness to take risks (in gambles 1 to 5, the expected value increases jointly with the variance, and in gamble 6 only the variance increases in comparison to gamble 5)
- Further, define **indicators** for being *risk-averse* (choosing one of the first four gambles), *risk-neutral* (gamble number 5), or *risk-seeking* (gamble number 6)

## Time preferences experiment

Experiment to elicit time preferences with choice list approach (Bauer et al. 2012):

<b>Choice set 1</b>	2 stars tomorrow	vs.	3 stars in 3 weeks
	2 stars tomorrow	vs.	4 stars in 3 weeks
<b>Choice set 2</b>	2 stars tomorrow	vs.	3 stars in 3 months
	2 stars tomorrow	vs.	4 stars in 3 months
<b>Choice set 3</b>	2 stars in 1 month	vs.	3 stars in 4 months
	2 stars in 1 month	vs.	4 stars in 4 months

Stars: experimental currency, like money

— **Patience**: count number of patient choices (between 0-6)

Wechsler Intelligence Scale for Children (Wechsler 2003):

- Consists of progressive matrices, digit span, symbol search, and word similarities tests
- Measuring fluid and crystallized IQ, which together form overall IQ (Cattell 1971)

Measure: **Aggregate IQ** where each standardized component enters with equal weight.

## **Aggregate patterns**

## Aggregate patterns: Panel data and development by age

Fundamental challenge of **disentangling age, period, and cohort effects** (perfect linear relationship).

Due to panel data, we can make progress by estimating models with economic preference measures as dependent variables and either sets of **age and survey year fixed effects**, or **age, survey year, and individual fixed effects** as independent variables.

- Survey year FE control for period effects (e.g., Covid-19)
- Individual FE for full leverage of panel data: Accounting for time-invariant individual characteristics incl. cohort effects

Results: With increasing age, children become **more prosocial, less patient and more likely to be risk-neutral instead of risk-averse or risk-seeking**. Age trends are uniform by gender and SES with level effects that match previous evidence.

# Aggregate patterns: Development by age

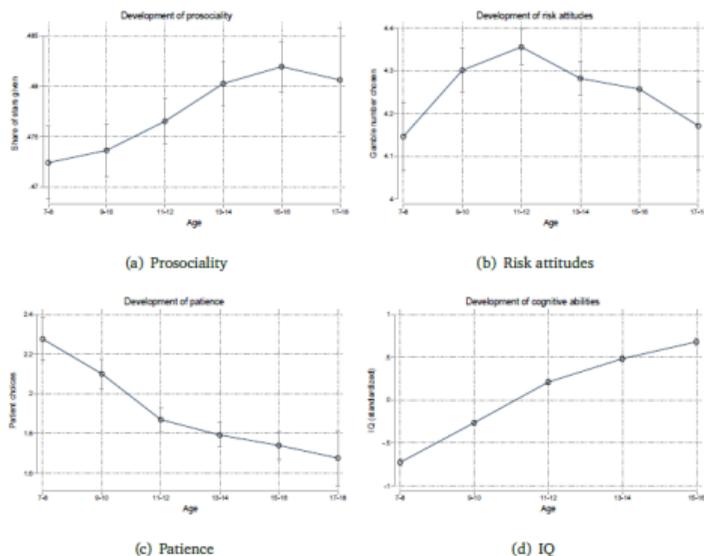


Figure 1. Age trajectory in economic preferences and IQ

NOTES: We regress each outcome variable on age dummies and year fixed effects. Standard errors are clustered at the household level. Prosociality reflects the proportion of stars given to the other child and ranges from 0.28 to 0.58. The risk-taking variable ranges from 1 to 6 and the patience scale ranges from 0 to 6. IQ is standardized to have a mean of zero and a standard deviation of 1 across the sample. The Wechsler Intelligence Scale for Children is used to measure IQ in children up to age 16.

## Aggregate patterns: Development by age

We investigate **degree of homogeneity in children's economic preferences** by examining the variance of distributions at different ages (pooled across all waves).

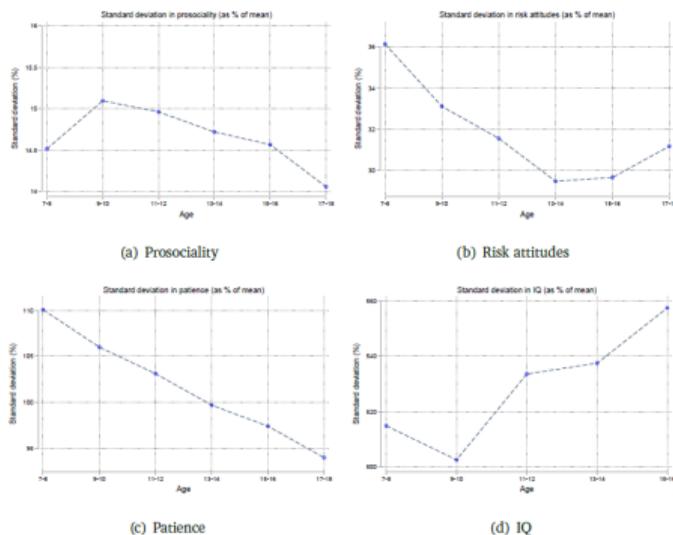


Figure: Standard deviation of economic preferences and IQ by age

Results: **Decline in variance of risk attitudes and patience with age**, suggesting that children are becoming more homogeneous in these preference dimensions.

## **Results on skill formation**

## Self-productivity

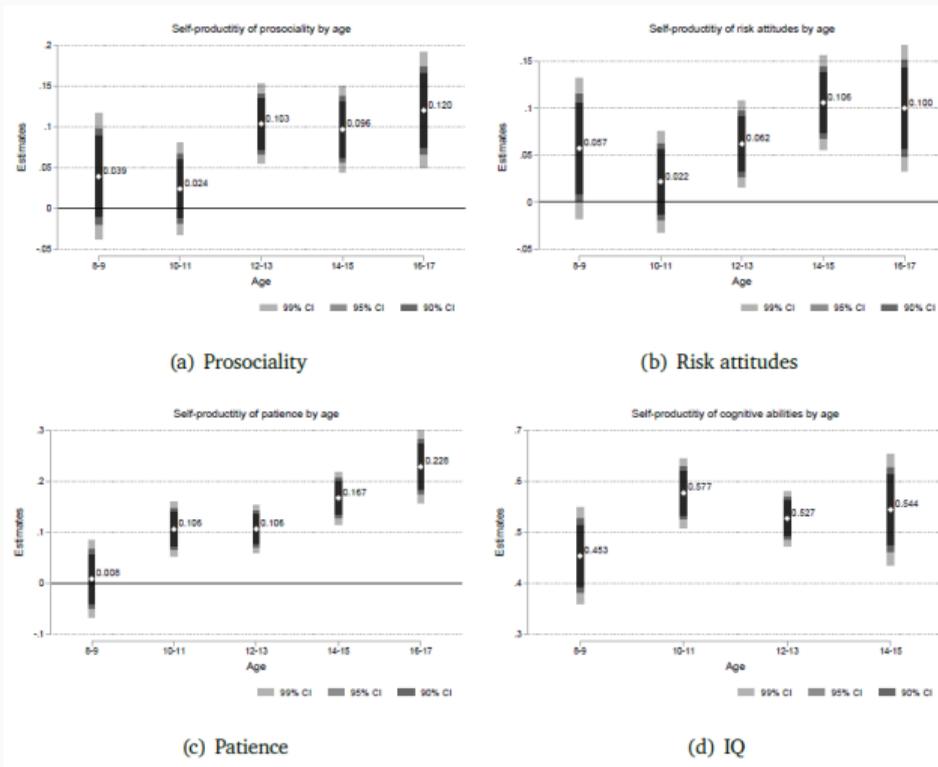
$$\theta_{t+1} = f_t(\theta_t, \sigma_p, \sigma_{sib}, I_t, S_t, \eta)$$

To provide evidence on self-productivity of skills, we regress children's preferences (in  $t$ ) on up to three lags ( $t-1$ ,  $t-2$ ,  $t-3$ ) **of the same preference dimension**.

	Prosociality in $t$	Risk attitude in $t$	Risk- aversion in $t$	Risk- neutrality in $t$	Risk- lovingness in $t$	Patience in $t$	Cognitive abilities in $t$
$t - 1$	0.128***	0.094***	0.086***	0.074***	0.077***	0.211***	0.438***
$t - 2$	0.063***	0.068***	0.073***	0.057***	0.062***	0.073***	0.301***
$t - 3$	0.065***	0.025	0.032	0.036*	0.026*	0.046***	—
N	2,644	2,644	2,644	2,645	2,645	2,645	2,990

NOTES: Each column is a separate regression with the column header as the outcome.  $t = 2022$  wave for economic preferences and 2020 for cognitive abilities. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Results: Not only the first lag, but all lags have explanatory power for the current value of a preference: preferences at a given age do not only depend on preferences in the previous year, **but also on earlier maturational stages**.



### Self-productivity of economic preferences and IQ by age

NOTES: We regress each outcome variable, as indicated at the bottom of each subfigure for time  $t$ , on the corresponding variable from time  $t - 1$ . This regression is estimated separately for each age group, and the resulting coefficients are plotted. To maximize the sample size, we pool data from all available waves and control for survey year fixed effects.

$$\theta_{t+1} = f_t(\theta_t, \sigma_p, \sigma_{sib}, I_t, S_t, \eta)$$

To provide evidence on cross-fertilization of skills, we regress children's preferences (in  $t$ ) on **other**, lagged ( $t-1$ ) **preference dimensions**.

	Prosociality in $t$	Risk attitude in $t$	Patience in $t$	Cog. abilities in $t$
<b>Prosociality</b> in $t - 1$	0.082***	-0.010	0.014	-0.016 * *
<b>Risk attitude</b> in $t - 1$	0.004	0.064***	0.009	-0.003
<b>Patience</b> in $t - 1$	0.015	-0.003	0.122***	0.034***
<b>Cognitive abilities</b> in $t - 1$	0.029 * *	-0.019*	-0.011	0.534***
N	10,880	10,880	10,880	7,317

NOTES: Each column is a separate regression with the column header as the outcome. All variables are standardized to have a mean of zero and standard deviation of one. OLS regression includes age and survey year fixed effects. Pooling all available waves (2018 wave has no lag and is omitted from the regression). Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Results: We do **not observe substantial cross-fertilization** of children's economic preferences. **Cognitive abilities** foster the development of prosociality and risk-aversion.

## Joint technology of skill formation: adding investments, shocks and family

	Dependent variable: Child's value in $t$			
	Prosociality in $t$	Risk attitude in $t$	Patience in $t$	Cognitive abilities in $t$
<b>Parental investments</b>				
Material investment in $t-1$	0.005	0.001	0.021	0.010
Positive parenting in $t-1$	0.049***	0.014	0.020	0.043***
<b>Monetary shock to the home environment</b>				
Loss of crops in $t-1$	-0.044	0.036	-0.090 * *	-0.041
<b>Lagged skills of sibling and parents</b>				
Sibling ( $t - 1$ )	0.003	0.009	0.047***	0.164***
Mother ( $t - 1$ )	0.000	0.002	0.047***	0.002
Father ( $t - 1$ )	0.053***	0.035 * *	0.035 * *	0.005
N	4,022	4,024	4,017	2,857

NOTES: We estimate a value-added model by regressing the outcome variable indicated in the column header in  $t$  on the variables denoted in the rows and the outcome in  $t - 1$ . Additional controls include fixed effects for age and survey year, and an indicator variable for gender. Each column is a separate regression with the column header as the outcome. Regressions are based on outcomes in wave 2019 and 2020. Standard errors are clustered at the household level. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Conclusion

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New insights based on **novel panel data** on children's and adolescents' economic preferences:

- Disentangling age, period, and cohort effects in panel analysis largely **confirms age patterns** in preference development based on cross-sectional data
- Exception: average **patience** decreases as children grow older, probably due to decrease for many children with high exposure to negative, exogenous shocks **individual heterogeneity** behind aggregate trends
- Heterogeneities in parenting style and parental time investments, exogenous shocks, transmission among family members all **contribute to heterogeneity in children's preference development**
- First **evidence on self-productivity** in formation of preferences, even beyond one-year time lag
- Nearly **no evidence for cross-fertilization** among different preference dimensions

**Many thanks for listening.**

Please send your feedback to [Shyamal.Chowdhury@anu.edu.au](mailto:Shyamal.Chowdhury@anu.edu.au)

**Back-up materials**

## Measures

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Experiment to elicit time preferences with choice list approach (Bauer et al. 2012):

<b>Choice set 1</b>	2 stars tomorrow	vs.	3 stars in 3 weeks
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	2 stars tomorrow	vs.	4 stars in 3 months
<b>Choice set 3</b>	2 stars in 1 month	vs.	3 stars in 4 months
	2 stars in 1 month	vs.	4 stars in 4 months

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— **Patience**: count number of patient choices (between 0-6)

## Time preferences experiment

Experiment to elicit time preferences with choice list approach (Bauer et al. 2012):

Choice set	Choice	Start (sooner date)	Delay length
Choice set 1	2 stars tomorrow ★★	vs.	3 stars in 3 weeks ★★★
	2 stars tomorrow ★★	vs.	4 stars in 3 weeks ★★★★
Choice set 2	2 stars tomorrow ★★	vs.	3 stars in 3 months ★★★
	2 stars tomorrow ★★	vs.	4 stars in 3 months ★★★★
Choice set 3	2 stars in 1 month ★★	vs.	3 stars in 4 months ★★★
	2 stars in 1 month ★★	vs.	4 stars in 3 weeks ★★★★

Stars: experimental currency, like money

— **Patience**: count number of patient choices (between 0-6)

## Percentage of people who remember the decision they made previously

Response	Frequency	Percent	Cum.
<b>Panel A: Children</b>			
NO	4,649	88.43	88.43
YES	608	11.57	100.00
Total	5,257	100.00	
<b>Panel B: Parents</b>			
NO	6,055	94.65	94.65
YES	342	5.35	100.00
Total	6,397	100.00	

NOTES: Parents and children response to the following question: "If you have done experiments last time, do you remember any of the decisions you made?"

# Aggregate patterns: Controlling for other preference dimensions and IQ

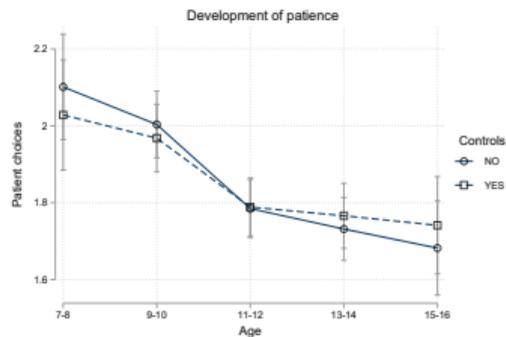


Figure: Patience

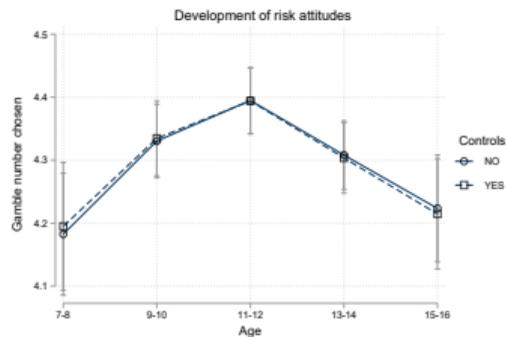


Figure: Risk attitude

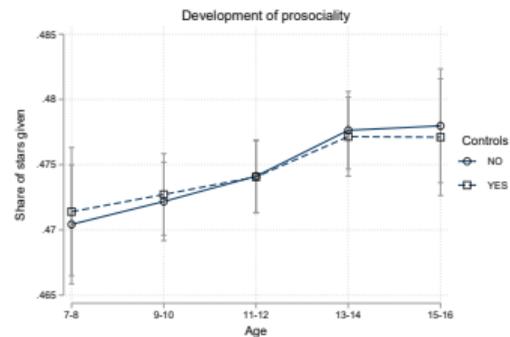


Figure: Prosociality

NOTES: The figures also control for the development of other economic preferences and cognitive skills over the same period for the same child. The IQ test for children was administered up to age 16, so we can only estimate these regressions up to that age.

# Aggregate patterns: Heterogeneity in age profiles by SES

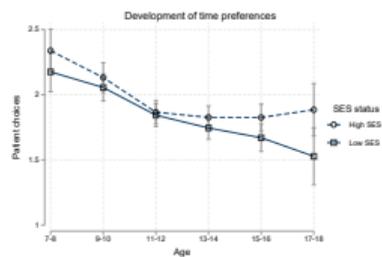


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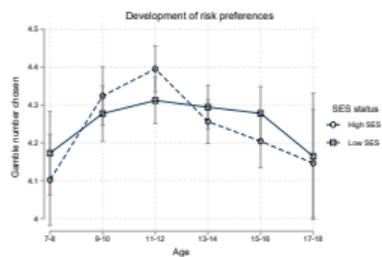


Figure: Risk attitude

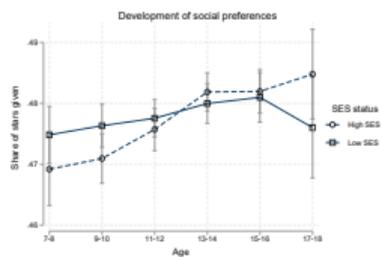


Figure: Prosociality

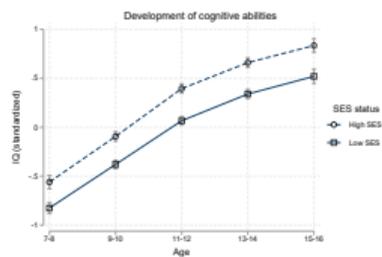


Figure: Cognitive abilities

# Aggregate patterns: Heterogeneity in age profiles by gender

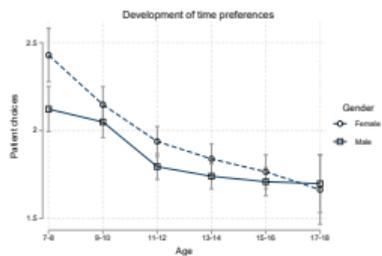


Figure: Patience

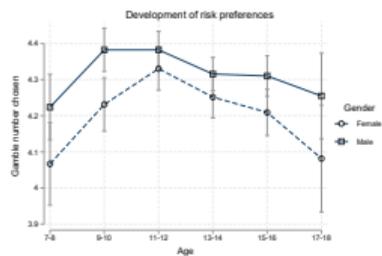


Figure: Risk attitude

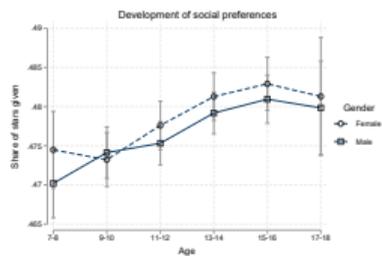


Figure: Prosociality

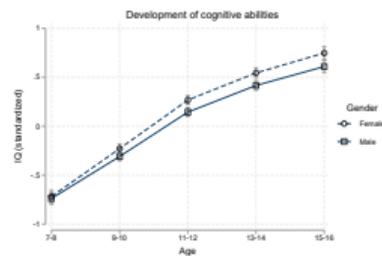


Figure: Cognitive abilities

## **Main results**

## Empirical strategy to explore age trends

Specification to estimate age pattern when **controlling for survey year fixed effects**:

$$y_{it} = \beta + \gamma \text{age}_{it} + \delta_t + \varepsilon_{it} \quad i = 1, \dots, N, t = 1, \dots, T,$$

where  $y_{it}$  is the economic preference measure (social, risk, time) for child  $i$  at time  $t$ .  $\gamma$  is the vector of coefficients of interest, the age effect, and age enters the specification as fixed effects in the form of indicator variables for 2-year age bins (from age 7-18) with ages 7-8 as the reference category.  $\delta_t$  denotes the vector of survey year fixed effects, and  $\varepsilon_{it}$  is the error term. Standard errors are clustered on person-level.

Specification to estimate age pattern when **additionally controlling for individual fixed effects**:

$$y_{it} = \gamma \text{age}_{it} + \delta_t + \alpha_i + \varepsilon_{it},$$

where  $\alpha_i$  denotes the additional vector of individual fixed effects and  $\varepsilon_{it}$  is the error term.

## Aggregate patterns: Development by age

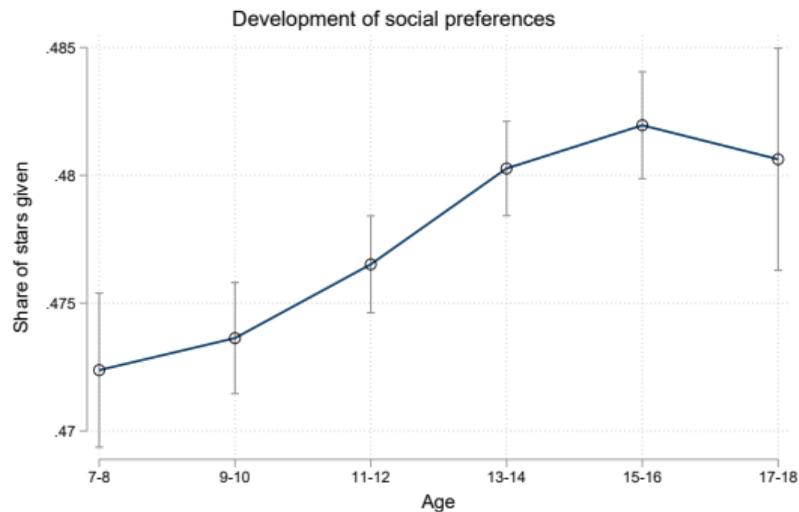
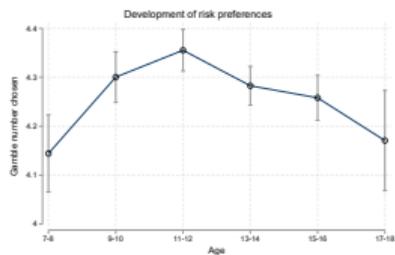


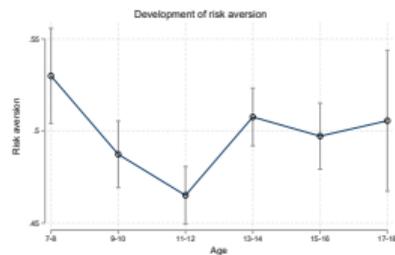
Figure: Prosociality

NOTES: Figure displays age profile of social preferences (prosociality) when regressing the preference measure on age FE and survey year FE. 95% CIs, standard errors clustered on person-level.

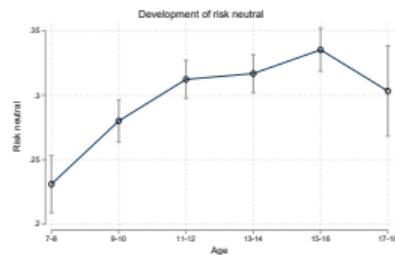
# Age profile of risk preferences



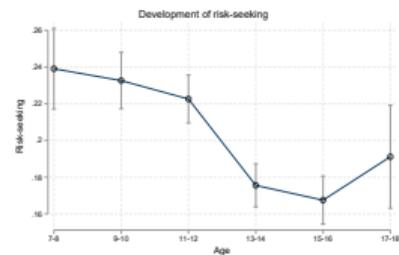
**Figure: Risk**



**Figure: Risk-aversion**



**Figure: Risk-neutrality**



**Figure: Risk-lovingness**

NOTES: Figures display age profiles of risk preferences (continuous risk and dummy variables for being risk-averse, risk-neutral, or risk-seeking) when regressing the preference measure on age FE and survey year FE. 95% CIs, standard errors clustered on person-level.

# Age profile of time preferences

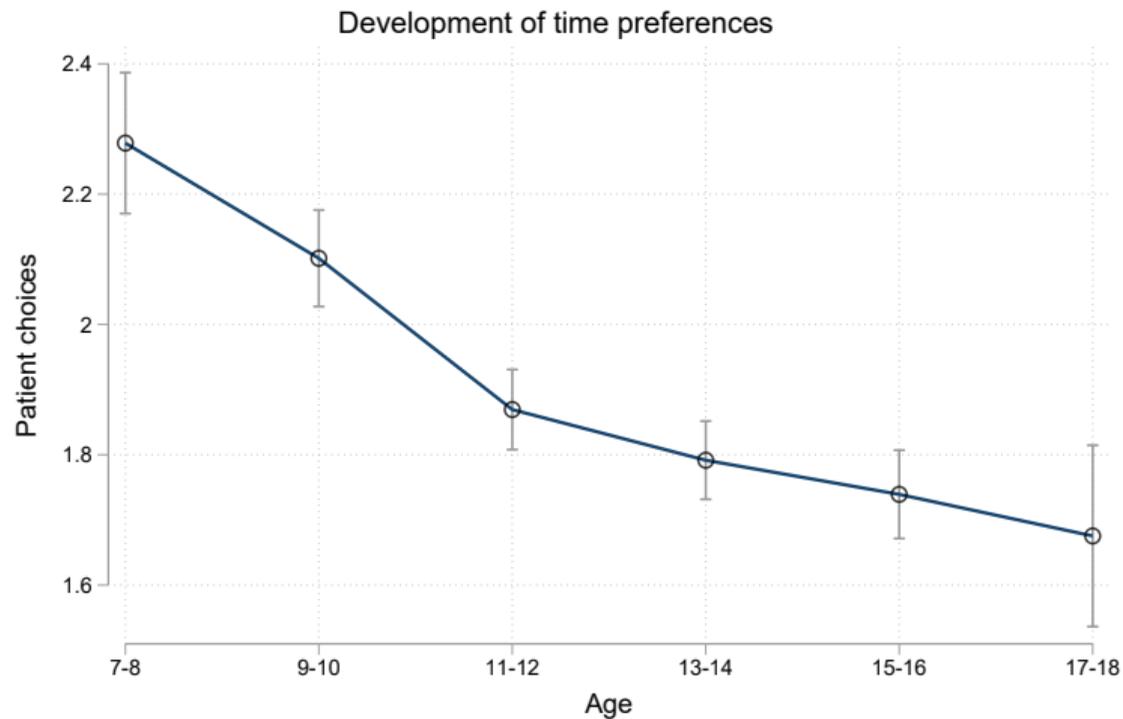


Figure: Patience

## Age trends of social and time preferences

**Table:** Specifications to estimate age trends of social and time preferences

	Prosociality		Patience	
	(1)	(2)	(3)	(4)
Age 9-10	0.001 (0.002)	-0.000 (0.003)	-0.177*** (0.065)	-0.113 (0.086)
Age 11-12	0.004* (0.002)	0.005 (0.004)	-0.409*** (0.063)	-0.288** (0.113)
Age 13-14	0.008*** (0.002)	0.009* (0.005)	-0.487*** (0.064)	-0.344** (0.147)
Age 15-16	0.010*** (0.002)	0.013** (0.007)	-0.539*** (0.067)	-0.395** (0.184)
Age 17-18	0.008** (0.003)	0.014 (0.009)	-0.603*** (0.094)	-0.392* (0.234)
Survey year FE	✓	✓	✓	✓
Individual FE	✗	✓	✗	✓
Constant	0.468*** (0.002)	0.467*** (0.003)	2.446*** (0.058)	2.393*** (0.087)
N	16,805	16,048	16,804	16,048

NOTES: Reference category for age FE is age 7-8. Prosociality is defined as the share of stars given to the other child and ranges from 0.28 to 0.58. Patience ranges from 0 to 6 (number of patient choices). Pooling all available waves. Standard errors clustered at individual level are reported in parentheses. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# Age trends of risk preferences

**Table:** Specifications to estimate age trends of risk preferences

	Risk attitude		Risk-aversion		Risk-neutrality		Risk-lovingness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age 9-10	0.156*** (0.047)	0.139 ** (0.060)	-0.043*** (0.016)	-0.056*** (0.021)	0.049*** (0.014)	0.041 ** (0.019)	-0.006 (0.014)	0.015 (0.018)
Age 11-12	0.211*** (0.045)	0.142* (0.079)	-0.065*** (0.015)	-0.080*** (0.027)	0.081*** (0.013)	0.053 ** (0.026)	-0.016 (0.013)	0.027 (0.023)
Age 13-14	0.138*** (0.045)	0.013 (0.103)	-0.022 (0.015)	-0.031 (0.036)	0.086*** (0.014)	0.040 (0.034)	-0.064*** (0.013)	-0.008 (0.030)
Age 15-16	0.114 ** (0.048)	-0.031 (0.130)	-0.033 ** (0.016)	-0.047 (0.046)	0.104*** (0.014)	0.050 (0.042)	-0.072*** (0.013)	-0.003 (0.038)
Age 17-18	0.026 (0.069)	-0.114 (0.167)	-0.024 (0.025)	-0.059 (0.060)	0.072*** (0.022)	0.012 (0.056)	-0.048 ** (0.019)	0.046 (0.049)
Survey year FE	✓	✓	✓	✓	✓	✓	✓	✓
Individual FE	✗	✓	✗	✓	✗	✓	✗	✓
Constant	4.331*** (0.042)	4.382*** (0.060)	0.446*** (0.014)	0.455*** (0.021)	0.236*** (0.012)	0.256*** (0.019)	0.317*** (0.012)	0.288*** (0.018)
N	16,806	16,049	16,806	16,049	16,806	16,049	16,806	16,049

NOTES: Reference category for age FE is age 7-8. Continuous risk (attitude) measures the willingness to take risks and ranges from 1-6 (gamble number that was picked). Risk-aversion (gamble 1-4), risk-neutrality (gamble 5), and risk-lovingness (gamble 6) are dummy variables. Pooling all available waves. Standard errors clustered at individual level are reported in parentheses. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# Measurement of parental investment

**Table:** PCA results for material investment and positive parenting

Latent factor	Measurement (items)	Factor loadings	
		Girls	Boys
<b>Material investment</b>	Cash given to children	0.4401	0.4488
	Childrens shoes and sandals	0.5847	0.6006
	Clothes for children	0.5821	0.5943
	School expenditure	0.3543	0.2911
		Both	
<b>Positive parenting</b>	I show my child love with words and gestures.	0.4761	
	I discuss my child's experiences.	0.4749	
	I always know where my child is outside.	0.4033	
	I comfort my child when they're sad.	0.4305	
	I praise my child.	0.4231	
	I influence my child's circle of friends.	0.1444	

NOTES: Table displays PCA factor loadings of items for parental investment indices. 2022 wave. School expenses include books and papers, tuition fees and the cost of private tutors.

**Table:** PCA results for quality time investment

Latent factor	Measurement (items)	Factor loadings	
		Mother	Father
<b>Quality time investment</b>	Discuss managing anger and strong feelings	0.4217	0.4256
	Discuss working cooperatively	0.4453	0.4614
	Discuss making good decisions	0.4378	0.4355
	Discuss dealing with bullying	0.3851	0.3910
	Having joint meals	0.1715	0.1772
	Talking about her/his school day	0.2933	0.2920
	Doing homework together	0.2560	0.2218
	Discussing challenges and decisions	0.3209	0.3125

NOTES: Table displays PCA factor loadings of items for parental investment indices. 2022 wave.

## Correlation matrix of parental investment indices

**Table:** Correlations of parental investment indices

	<b>Material investment (both)</b>	<b>Positive parenting (mother)</b>	<b>Quality time (father)</b>	<b>Quality time (mother)</b>
Material investment	1.0000			
Positive Parenting	0.1007	1.0000		
Quality time (father)	0.0206	0.0620	1.0000	
Quality time (mother)	0.0538	-0.0094	0.1738	1.0000

NOTES: Displayed are correlation coefficients of indices for material investment (from both parents), the degree of positive parenting (answered by mothers), and quality time investment by fathers and mothers. 2022 wave.

# Addressing the endogeneity of material investments

Table: First-stage results

	Material investment
log (Price of Hybrid seed - Boro)	-0.435*** (0.124)
log (Price of Hybrid seed - Vegetables)	-0.079*** (0.020)
Constant	3.067*** (0.718)
<i>F</i> -statistics	15.16
N	4,511

NOTES: The data for village prices and material investments are from the 2018 wave. Controls include age fixed effects and a female dummy. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table: Second-stage results

	Prosociality	Risk attitude	Patience	Cognitive abilities
<b>Panel A: Endogenous material investment</b>				
Material investment	0.017 (0.017)	0.008 (0.015)	0.002 (0.015)	0.175*** (0.020)
N	4,483	4,483	4,483	3,169
<b>Panel B: Exogenous material investment</b>				
Material investment (instrumented)	-0.134 (0.209)	0.228 (0.205)	0.384* (0.211)	1.019*** (0.181)
N	4,189	4,189	4,189	3,002

NOTES: Each column is a separate regression with the column header as the outcome. Controls include age fixed effects and a gender dummy. 2018 wave. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

## The role of parental investments by age

	Young (up to age 14)				Old (above age 14)			
	Prosociality	Risk attitude	Patience	IQ	Prosociality	Risk attitude	Patience	IQ
Material investment	0.031	0.018	0.000	0.178***	-0.001	0.001	-0.012	0.183***
Positive parenting	0.017	0.008	0.029	0.054 **	0.105***	-0.001	0.005	0.120 **
Time investment (father)	0.006	0.013	0.008	—	-0.025	-0.029	0.010	—
Time investment (mother)	-0.021	-0.058 **	0.052*	—	0.022	-0.075 **	0.044	—
N	1915	1915	1915	5714	1810	1810	1810	356

NOTES: Regressions are based on wave 2022 for economic preferences and on wave 2018 and 2019 for cognitive abilities. Each column is a separate regression with the column header as the outcome. Economic preferences are standardized (across 2022 wave). Controls include age fixed effects and a gender dummy. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# Introduction of paid maternity leave in 2008

**Table:** The impact of paid maternity leave on children's preferences

	Prosociality	Risk attitude	Patience
<b>Panel A: baseline</b>			
Paid maternity leave [2008] × mother working [baseline]	0.060* (0.034)	0.026 (0.036)	-0.029 (0.035)
N	16,803	16,804	16,802
<b>Panel B: including siblings fixed effects</b>			
Paid maternity leave [2008] × mother working [baseline]	0.104 ** (0.046)	0.021 (0.050)	-0.020 (0.046)
N	11,497	11,498	11,495

NOTES: Each column is a separate regression with the column header as the outcome. Controls in both specifications include age and survey year fixed effects, a gender dummy and an indicator for the number of siblings. Panel B includes sibling fixed effects and an indicator for sibling age difference. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

## Children's mental health and productivity of inputs

$$\theta_{t+1} = f_t(\theta_t, \sigma_p, \sigma_{sib}, I_t, S_t, \eta; m_t)$$

We hypothesize that **children's mental health**,  $m$ , influences **perception of parental investments**: Children better able to process parental investments if they have good mental health.

	Good mental health conditions			Bad mental health conditions		
	Prosociality	Risk attitude	Patience	Prosociality	Risk attitude	Patience
Material investment	0.029*	0.012	0.001	-0.002	0.002	-0.062
Positive parenting	0.055***	-0.007	0.032*	-0.057	0.045	-0.041
Time investment (father)	-0.013	-0.007	0.017	-0.004	0.008	0.051
Time investment (mother)	-0.019	-0.073***	0.025	0.010	-0.016	0.117 **
N	2,989	2,989	2,989	747	747	747

NOTES: Each column is a separate regression with the column header as the outcome. Controls include age FE and gender. 2022 wave. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Results: Largely **in line with hypothesis**.

## Measuring mental health problems

Behavioral disorders, emotional symptoms and hyperactivity from the **Strengths and Difficulties Questionnaire** are highly predictive for child psychiatric disorders (Goodman et al., 2000).

- Used by the WHO as a diagnostic criterion for child psychiatric disorders
- Mullick and Goodman (2001) validated the use in Bangladesh and recommended critical values that indicate mental health problems
- 24,4 percent of the children in our estimation sample have mental health problems

## Children's mental health and productivity of inputs

	Prosociality	Risk attitude	Patience
<b>Panel A: Good mental health conditions</b>			
Material investment	0.029*	0.012	0.001
	(0.017)	(0.018)	(0.019)
Positive parenting	0.055***	-0.007	0.032*
	(0.018)	(0.018)	(0.018)
Time investment (father)	-0.013	-0.007	0.017
	(0.022)	(0.020)	(0.021)
Time investment (mother)	-0.019	-0.073***	0.025
	(0.023)	(0.023)	(0.024)
N	2,989	2,989	2,989
<b>Panel B: Bad mental health conditions</b>			
Material investment	-0.002	0.002	-0.062
	(0.041)	(0.041)	(0.040)
Positive parenting	-0.057	0.045	-0.041
	(0.037)	(0.038)	(0.040)
Time investment (father)	-0.004	0.008	0.051
	(0.040)	(0.043)	(0.049)
Time investment (mother)	0.010	-0.016	0.117**
	(0.047)	(0.051)	(0.047)
N	747	747	747

NOTES: Each column is a separate regression with the column header as the outcome. Controls include age FE and gender. 2022 wave. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

## Balancing table

	Wealth index (2019) (standardized)	Family income (2019) (standardized)
Flood	0.005 (0.047)	0.017 (0.041)
N	3918	3941

NOTES: OLS regression with the outcome variables indicated in the column header. The flood affected 19.1 per cent of the children in the sample. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Impact of crop loss on skills of all family members

	Prosociality	Risk attitude	Patience	Cognitive abilities
<b>Panel A: Mother</b>				
Loss of crops	0.026 (0.033)	-0.035 (0.034)	-0.090*** (0.034)	-0.244*** (0.029)
N	8874	8874	8864	8874
<b>Panel B: Father</b>				
Loss of crops	0.040 (0.034)	-0.025 (0.036)	-0.082 ** (0.036)	-0.229*** (0.031)
N	6914	6914	6910	6913
<b>Panel C: Children</b>				
Loss of crops	-0.003 (0.028)	-0.063 ** (0.028)	-0.108*** (0.030)	-0.278*** (0.027)
N	8672	8673	8671	6171

NOTES: Each column is a separate regression with the column header as the outcome. A sudden loss of crops affected 21.1 percent of the children in the sample. Controls include age fixed effects. Wave 2018 and 2019. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

# Impact of crop loss on children's skills by age

**(Exogenous) shocks:** regress children's preferences on exposure to loss of crops, causing high economic distress to families, by age.

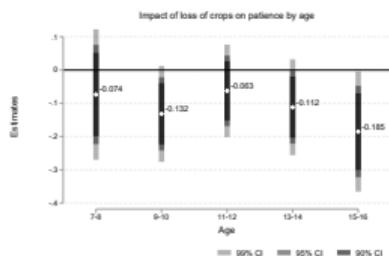


Figure: Patience

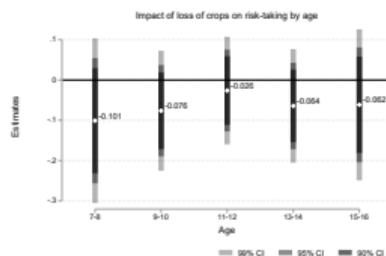


Figure: Risk attitude

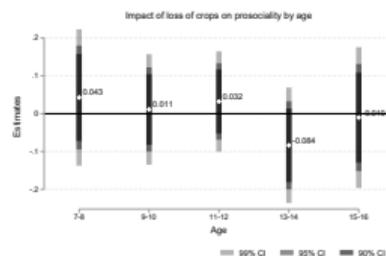


Figure: Prosociality

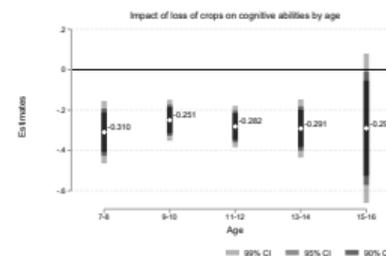


Figure: Cognitive abilities

# Impact of flood exposure by age

**(Exogenous) shocks:** regress children's preferences on exposure to severe flood, causing high economic distress to families, by age.

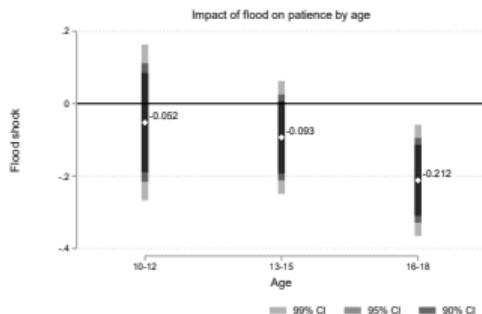


Figure: Patience

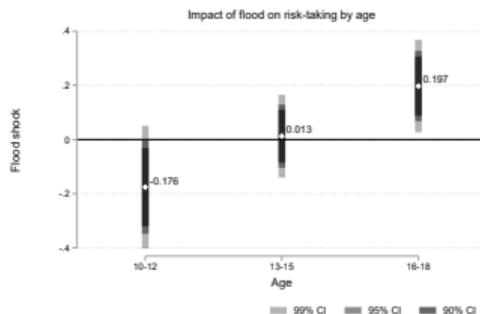


Figure: Risk attitude

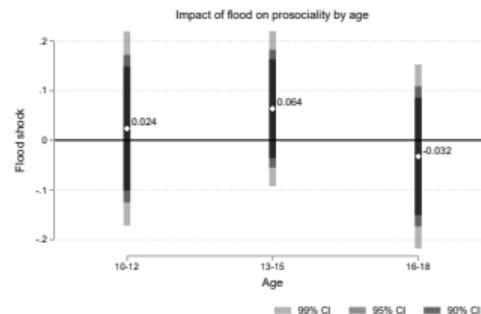


Figure: Prosociality

## The role of family members

	Dependent variable: Child's value in $t$						
	Prosociality in $t$	Risk attitude in $t$	Risk- aversion in $t$	Risk- neutrality in $t$	Risk- lovingness in $t$	Patience in $t$	Cognitive abilities in $t$
Child ( $t - 1$ )	0.075*** (0.014)	0.067*** (0.013)	0.074*** (0.014)	0.063*** (0.014)	0.056*** (0.014)	0.102*** (0.014)	0.462*** (0.021)
Sibling ( $t - 1$ )	0.016 (0.013)	0.001 (0.012)	-0.007 (0.013)	0.005 (0.013)	0.001 (0.012)	0.035 ** (0.014)	0.168*** (0.017)
Mother ( $t - 1$ )	0.005 (0.014)	-0.006 (0.012)	-0.003 (0.013)	0.010 (0.014)	0.004 (0.012)	0.017*** (0.005)	0.010 (0.017)
Father ( $t - 1$ )	0.048*** (0.014)	0.033*** (0.012)	0.022* (0.013)	-0.016 (0.013)	0.022* (0.012)	0.015*** (0.005)	0.008 (0.015)
N	5,823	5,825	5,825	5,825	5,825	5,818	2,859

NOTES: Each column is a separate regression with the column header as the outcome. OLS regression includes survey year fixed effects. Pooling all available waves, i.e.,  $t = 2019, 2020, 2022$ . Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Co-development of family members

Dyad	Preference type	$r(I_{\text{child}}, I_{\text{dyad}})$		$r(S_{\text{child}}, S_{\text{dyad}})$	
		<i>Est.</i>	<i>SE</i>	<i>Est.</i>	<i>SE</i>
Mother	Patience	2.557***	0.165	1.059***	0.085
	Risk	0.176***	0.029	0.054***	0.016
	Stars (*100)	7.372***	0.704	2.009***	0.367
Father	Patience	2.226***	0.192	0.670***	0.095
	Risk	0.089***	0.031	0.028	0.017
	Stars (*100)	5.432***	0.741	2.001***	0.398
Siblings	Patience	1.002***	0.050	0.092*	0.008
	Risk	0.155***	0.023	0.019***	0.004
	Stars (*100)	9.460***	0.794	0.588***	0.050

NOTES: Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Cross-sectional relationship by age (median split)

	Young (up to age 11)				Older (above age 11)			
	Prosociality in $t$	Risk in $t$	Patience in $t$	Cognitive abilities in $t$	Prosociality in $t$	Risk in $t$	Patience in $t$	Cognitive abilities in $t$
<b>Parental investments</b>								
Material investment in $t$	-0.012	0.009	-0.036	0.050 * *	0.039*	-0.003	-0.026	0.033
Positive parenting in $t$	-0.030	0.007	0.026	0.001	0.000	-0.050***	0.038 * *	0.028
<b>Monetary shock to the home environment</b>								
Loss of crops in $t$	0.034	-0.085*	-0.014	-0.143***	-0.032	-0.060	-0.103 * *	-0.123***
<b>Skills of sibling and parents</b>								
Sibling in $t$	0.153***	0.120***	0.313***	0.140***	0.121***	0.099***	0.270***	0.253***
Mother in $t$	0.109***	0.057 * *	0.126***	0.195***	0.103***	0.063***	0.111***	0.256***
Father in $t$	0.080***	0.041*	0.045 * *	0.137***	0.087***	0.040 * *	0.111***	0.180***
N	2302	2304	2299	1561	2411	2411	2408	1303

NOTES: Each column is a separate regression with the column header as the outcome. Controls include fixed effects for age and survey year, and an indicator variable for gender.  $t = 2018$  and 2019 wave. Young: up to age 11, old: above age 11. Standard errors are clustered at the household level. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Cross-sectional relationship

	Dependent variable: Child's value in $t$			
	Prosociality	Risk attitude	Patience	Cognitive abilities
	in $t$	in $t$	in $t$	in $t$
<b>Parental investments</b>				
Material investment in $t$	0.018	0.001	-0.029**	0.036**
Positive parenting in $t$	-0.015	-0.023*	0.032**	0.010
<b>Monetary shock to the home environment</b>				
Loss of crops in $t$	-0.001	-0.073**	-0.061**	-0.128***
<b>Skills of sibling and parents</b>				
Sibling in $t$	0.136***	0.109***	0.292***	0.182***
Mother in $t$	0.107***	0.060***	0.118***	0.223***
Father in $t$	0.085***	0.040***	0.079***	0.159***
N	4713	4715	4707	2864

NOTES: Each column is a separate regression with the column header as the outcome. Controls include fixed effects for age and survey year, and an indicator variable for gender. Pooling all available waves, i.e.,  $t = 2018$  and  $2019$ . Standard errors are clustered at the household level. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

## Self-productivity

	<b>Prosociality</b> in $t$	<b>Risk</b> <b>attitude</b> in $t$	<b>Risk-</b> <b>aversion</b> in $t$	<b>Risk-</b> <b>neutrality</b> in $t$	<b>Risk-</b> <b>lovingness</b> in $t$	<b>Patience</b> in $t$	<b>Cognitive</b> <b>abilities</b> in $t$
$t - 1$	0.128*** (0.023)	0.094*** (0.019)	0.086*** (0.019)	0.074*** (0.020)	0.077*** (0.021)	0.211*** (0.021)	0.438*** (0.017)
$t - 2$	0.063*** (0.017)	0.068*** (0.019)	0.073*** (0.019)	0.057*** (0.020)	0.062*** (0.019)	0.073*** (0.018)	0.301*** (0.017)
$t - 3$	0.065*** (0.018)	0.025 (0.017)	0.032 (0.020)	0.036* (0.020)	0.026* (0.015)	0.046*** (0.017)	— —
N	2,644	2,644	2,644	2,645	2,645	2,645	2,990

NOTES: Each column is a separate regression with the column header as the outcome.  $t = 2022$  wave for economic preferences and 2020 for cognitive abilities. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

## Mother's self-productivity

	Prosociality in $t$	Risk attitude in $t$	Risk- aversion in $t$	Risk- neutrality in $t$	Risk- lovingness in $t$	Patience in $t$	Cognitive abilities in $t$
$t - 1$	0.048*** (0.016)	0.099*** (0.017)	0.086*** (0.017)	0.045 ** (0.019)	0.069*** (0.018)	0.119*** (0.016)	0.391*** (0.017)
$t - 2$	0.007 (0.015)	0.053*** (0.016)	0.061*** (0.018)	0.049*** (0.019)	0.033 ** (0.016)	0.035 ** (0.016)	0.280*** (0.019)
N	3,259	3,259	3,259	3,259	3,259	3,259	2,990

NOTES: Each column is a separate regression with the column header as the outcome.  $t = 2020$  wave. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Father's self-productivity

	<b>Prosociality</b> in $t$	<b>Risk attitude</b> in $t$	<b>Risk- aversion</b> in $t$	<b>Risk- neutrality</b> in $t$	<b>Risk- lovingness</b> in $t$	<b>Patience</b> in $t$	<b>Cognitive abilities</b> in $t$
$t - 1$	0.086*** (0.021)	0.043* (0.023)	0.093*** (0.021)	0.088*** (0.022)	0.065*** (0.022)	0.092*** (0.020)	0.386*** (0.022)
$t - 2$	0.043** (0.021)	0.073*** (0.023)	0.082*** (0.021)	0.046** (0.021)	0.047** (0.020)	0.086*** (0.019)	0.259*** (0.022)
N	2,199	2,199	2,199	2,199	2,199	2,199	2,990

NOTES: Each column is a separate regression with the column header as the outcome.  $t = 2020$  wave. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Self-productivity by age

	Young (up to age 14)				Old (above age 14)			
	Prosociality in $t$	Risk attitude in $t$	Patience in $t$	IQ in $t$	Prosociality in $t$	Risk attitude in $t$	Patience in $t$	IQ in $t$
$t - 1$	0.104*** (0.031)	0.082*** (0.028)	0.175*** (0.029)	0.462*** (0.019)	0.149*** (0.033)	0.106*** (0.027)	0.249*** (0.030)	0.372*** (0.033)
$t - 2$	0.054 ** (0.023)	0.058 ** (0.028)	0.059 ** (0.025)	0.296*** (0.021)	0.071*** (0.025)	0.078*** (0.026)	0.086*** (0.026)	0.309*** (0.040)
$t - 3$	0.047* (0.026)	0.024 (0.023)	0.033 (0.025)	— —	0.080*** (0.026)	0.026 (0.024)	0.056 ** (0.023)	— —
N	1286	1287	1286	2284	1358	1358	1358	706

NOTES: Each column is a separate regression with the column header as the outcome. OLS regression includes age fixed effects.  $t$  = 2022 wave. Young: up to age 14, old: above age 14. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

## Cross-fertilization

	<b>Prosociality</b> in $t$	<b>Risk attitude</b> in $t$	<b>Patience</b> in $t$	<b>Cog. abilities</b> in $t$
<b>Prosociality</b> in $t - 1$	0.082*** (0.011)	-0.010 (0.009)	0.014 (0.009)	-0.016 * * (0.008)
<b>Risk attitude</b> in $t - 1$	0.004 (0.010)	0.064*** (0.010)	0.009 (0.009)	-0.003 (0.008)
<b>Patience</b> in $t - 1$	0.015 (0.009)	-0.003 (0.009)	0.122*** (0.010)	0.034*** (0.008)
<b>Cognitive abilities</b> in $t - 1$	0.029 * * (0.012)	-0.019* (0.011)	-0.011 (0.012)	0.534*** (0.012)
<b>N</b>	10,880	10,880	10,880	7,317

NOTES: Each column is a separate regression with the column header as the outcome. All variables are standardized to have a mean of zero and standard deviation of one. OLS regression includes age and survey year fixed effects. Pooling all available waves (2018 wave has no lag and is omitted from the regression). Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Cross-fertilization by age

	Young (up to age 12)				Old (above age 12)			
	Prosociality in $t$	Risk attitude in $t$	Patience in $t$	Cog. abilities in $t$	Prosociality in $t$	Risk attitude in $t$	Patience in $t$	Cog. abilities in $t$
<b>Prosociality</b> in $t - 1$	0.043*** (0.016)	-0.032 ** (0.016)	0.005 (0.015)	-0.009 (0.012)	0.118*** (0.017)	-0.001 (0.013)	0.017 (0.013)	-0.014 (0.013)
<b>Risk attitude</b> in $t - 1$	0.020 (0.015)	0.043*** (0.015)	0.004 (0.015)	0.009 (0.011)	0.007 (0.015)	0.092*** (0.015)	0.013 (0.014)	-0.021 (0.015)
<b>Patience</b> in $t - 1$	0.016 (0.015)	-0.024 (0.015)	0.087*** (0.015)	0.046*** (0.011)	0.019 (0.014)	-0.002 (0.013)	0.167*** (0.015)	0.017 (0.013)
<b>Cognitive abilities</b> in $t - 1$	0.042 ** (0.020)	-0.007 (0.020)	0.016 (0.021)	0.525*** (0.018)	0.015 (0.017)	-0.024 (0.016)	-0.015 (0.017)	0.564*** (0.018)
<b>N</b>	4027	4027	4027	3383	4940	4940	4940	2773

NOTES: Each column is a separate regression with the column header as the outcome. All variables are standardized to have a mean of zero and standard deviation of one. OLS regression includes age and survey year fixed effects. Pooling all available waves (2018 wave has no lag and is omitted from the regression). Young: up to age 12, old: above age 12. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

## Cross-fertilization - mother

	<b>Prosociality</b> in $t$	<b>Risk attitude</b> in $t$	<b>Patience</b> in $t$	<b>Cog. abilities</b> in $t$
<b>Prosociality</b> in $t - 1$	0.065*** (0.011)	0.010 (0.011)	0.013 (0.011)	0.003 (0.010)
<b>Risk attitude</b> in $t - 1$	-0.028 ** (0.011)	0.061*** (0.011)	0.014 (0.011)	0.017* (0.010)
<b>Patience</b> in $t - 1$	0.003 (0.011)	0.027 ** (0.011)	0.093*** (0.011)	0.015 (0.009)
<b>Cognitive abilities</b> in $t - 1$	0.047*** (0.012)	0.016 (0.011)	-0.015 (0.011)	0.496*** (0.013)
<b>N</b>	7,677	7,677	7,672	7,678

NOTES: Each column is a separate regression with the column header as the outcome. All variables are standardized to have a mean of zero and standard deviation of one. OLS regression includes age and survey year fixed effects. Pooling all available waves (2018 wave has no lag and is omitted from the regression). Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Cross-fertilization - father

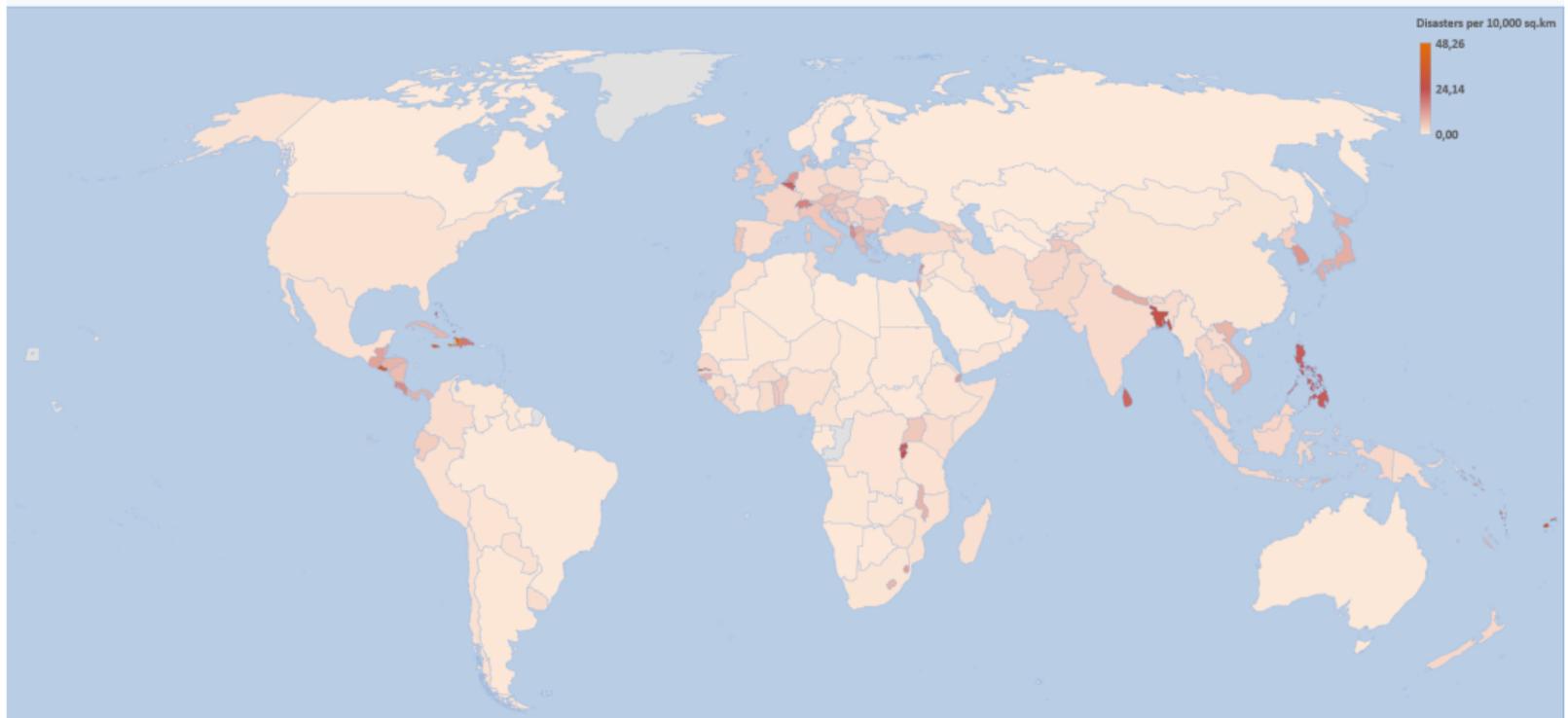
	Prosociality in $t$	Risk attitude in $t$	Patience in $t$	Cog. abilities in $t$
<b>Prosociality</b> in $t - 1$	0.058*** (0.014)	-0.003 (0.013)	0.009 (0.013)	-0.016 (0.012)
<b>Risk attitude</b> in $t - 1$	-0.028 ** (0.013)	0.053*** (0.014)	0.019 (0.013)	-0.000 (0.012)
<b>Patience</b> in $t - 1$	0.039*** (0.013)	0.011 (0.013)	0.112*** (0.013)	0.005 (0.012)
<b>Cognitive abilities</b> in $t - 1$	0.012 (0.014)	0.017 (0.014)	-0.027 ** (0.013)	0.454*** (0.015)
<b>N</b>	5501	5501	5499	5501

NOTES: Each column is a separate regression with the column header as the outcome. All variables are standardized to have a mean of zero and standard deviation of one. OLS regression includes age and survey year fixed effects. Pooling all available waves (2018 wave has no lag and is omitted from the regression). Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Further results

# Global variation in exposure to natural disasters

Total Natural Disasters per Land Area (in 10k sq. km; 1950-2022)



Source: EM-DAT data, own calculations.

## Shocks and patience

	Dep var: value in 2019 - value in 2018		
	(1)	(2)	(3)
	Change in patience	Change in self-assessed time preferences	Change in PCA index of both items
<b>Panel A: Any shock - reference category: no shock</b>			
Any shock in wave 2018	-0.232** (0.102)	-0.305*** (0.052)	-0.273*** (0.052)
N	3460	3461	3460
<b>Panel B: Loss of crops - reference category: no loss of crops</b>			
Loss of crops in wave 2018	-0.307*** (0.107)	-0.439*** (0.055)	-0.384*** (0.056)
N	3460	3461	3460

NOTES: Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## Zooming in: An unusual decline in patience?

Contrary to findings in richer, Western countries, we observe a significant **decline in patience** during childhood and adolescence.

Exploration: Do **exogenous shocks** (e.g., triggered by natural disasters) influence children's patience?

	Combined patience measure	
Experienced any shock in 2018:	YES	NO
Experienced flood shock in 2022:	YES	NO
Age 9-10	-0.157 (0.133)	0.151 ** (0.071)
Age 11-12	-0.374*** (0.135)	0.099 (0.071)
Age 13-14	-0.315 ** (0.136)	0.156 ** (0.074)
Age 15-16	-0.416*** (0.145)	0.210 ** (0.083)
Age 17-18	-0.377 ** (0.173)	0.187* (0.102)
N	1,926	3,221

NOTES: Reference category for age FE is age 7-8. PCA of self-assessed and experimentally measured patience is regressed on age dummy variables (2-year age bins). 2022 wave. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Results: **Experiencing a shock increases the likelihood that patience decreases.**

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Contrary to findings in richer, Western countries, we observe a significant **decline in patience** during childhood and adolescence.

Exploration: Do **exogenous shocks** (e.g., triggered by natural disasters) influence children's patience?

	Patience	
	YES	NO
Experienced any shock in 2018:	YES	NO
Experienced flood shock in 2022:	YES	NO
Age 9-10	-0.322	0.152
Age 11-12	-0.686***	0.028
Age 13-14	-0.765***	0.079
Age 15-16	-1.034***	0.076
Age 17-18	-1.007***	0.015
N	1,926	3,222

NOTES: Reference category for age FE is age 7-8. Patience (range: 0-6) is regressed on age dummy variables (2-year age bins). 2022 wave. Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Results: **Experiencing a shock increases the likelihood that patience decreases.**

## Zooming in: An unusual decline in patience?

Contrary to findings in richer, Western countries, we observe a significant **decline in patience** during childhood and adolescence.

Exploration: Do **exogenous shocks** (e.g., triggered by natural disasters) influence children's patience?

	Self-assessed time preferences	
Experienced any shock in 2018:	YES	NO
Experienced flood shock in 2022:	YES	NO
Age 9-10	-0.077 (0.120)	0.156 ** (0.072)
Age 11-12	-0.226* (0.121)	0.138* (0.072)
Age 13-14	-0.094 (0.122)	0.202*** (0.073)
Age 15-16	-0.114 (0.135)	0.284*** (0.083)
Age 17-18	-0.068 (0.162)	0.283*** (0.099)
N	1,927	3,222

NOTES: Reference category for age FE is age 7-8. Self-assessed time preferences is regressed on age dummy variables (2-year age bins). 2022 wave. Significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Results: **Experiencing a shock increases the likelihood that patience decreases.**

# Shocks and patience

**Table:** Age profiles of patience by shock experiences

	Dependent variable: Patience					
	Effect of shocks in 2018				Effect of shocks in 2018 and 2022	
	(1)	(2)	(3)	(4)	(5)	(6)
Experienced any shock in 2018:	YES	NO	YES	NO	YES	NO
Experienced flood shock in 2022:					YES	NO
Controlling for shocks 2019-2022:	X	X	✓	✓	X	X
Age 9-10	-0.192*	0.123	-0.073	0.175	-0.322	0.152
	(0.110)	(0.134)	(0.116)	(0.140)	(0.262)	(0.144)
Age 11-12	-0.388***	-0.046	-0.254 **	0.034	-0.686***	0.028
	(0.104)	(0.133)	(0.111)	(0.141)	(0.261)	(0.144)
Age 13-14	-0.508***	0.000	-0.381***	0.065	-0.765***	0.079
	(0.107)	(0.134)	(0.115)	(0.147)	(0.263)	(0.150)
Age 15-16	-0.559***	-0.027	-0.389***	0.100	-1.034***	0.076
	(0.110)	(0.141)	(0.124)	(0.162)	(0.277)	(0.166)
Age 17-18	-0.546***	-0.067	-0.374 **	0.061	-1.007***	0.015
	(0.141)	(0.191)	(0.154)	(0.211)	(0.324)	(0.214)
N	9,863	4,240	8,221	3,568	1,926	3,222

NOTES: Reference category for age FE is age 7-8. Patience (range: 0-6) is regressed on age dummy variables (2-year age bins) and survey year fixed effects. Columns (3) and (4) additionally control for shocks after 2018 (i.e., dummy variables for any shock in 2019 and 2022 waves). Pooling all available waves in columns (1) to (4), using only 2022 wave in columns (5) and (6). Significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

**Bangladesh**

## Back-up: World map



## Back-up: Districts



## Measures: Prosociality

... captures **altruistic/prosocial** behaviors in interpersonal situations.

Experiment (Fehr et al. 2008, Bauer et al. 2014):

- Children played four **dictator games** dividing stars between themselves and another child
- In each of four choices  $(x,y)$ , one option was allocation  $(1,1)$ , while alternative benefited one of children:  $(2,0)$ ,  $(1,0)$ ,  $(1,2)$ ,  $(2,3)$

Measure: Overall **share of stars a child has given to the other child** across all four games

## Measures: Risk attitude

... captures **willingness to take risks**.

Experiment (Binswanger 1980, Bauer et al. 2012):

- Each child chose one of six gambles yielding either high or low payoff with equal probability
- Low payoff decreasing and high payoff increasing for each successive gamble
- Choices of higher gamble numbers (higher variance and higher expected value): Higher willingness to take risks

Measure: **Number of chosen gamble** (between 1-6)

## Measures: Patience

Time preferences key to **inter-temporal trade-offs**. In inter-temporal utility, patience represented by long-run discount factor.

Experiment (Bauer et al. 2012):

- Based on **choice list approach**: Six choices within three choice sets between smaller, sooner and larger, later rewards
- Choice sets had different sooner dates (the next day vs. in 1 month) and different delay lengths (3 weeks vs. 3 months)

Measure: **Number of patient choices** (between 0-6), i.e., larger, later reward

## Time preferences experiment

Experiment to elicit time preferences with choice list approach (Bauer et al. 2012):

Choice set	Choice	Start (sooner date)	Delay length
Choice set 1	2 stars tomorrow ★★	vs.	3 stars in 3 weeks ★★★
	2 stars tomorrow ★★	vs.	4 stars in 3 weeks ★★★★
Choice set 2	2 stars tomorrow ★★	vs.	3 stars in 3 months ★★★
	2 stars tomorrow ★★	vs.	4 stars in 3 months ★★★★
Choice set 3	2 stars in 1 month ★★	vs.	3 stars in 4 months ★★★
	2 stars in 1 month ★★	vs.	4 stars in 3 weeks ★★★★

Stars: experimental currency, like money

— **Patience**: count number of patient choices (between 0-6)

# Self-productivity by age

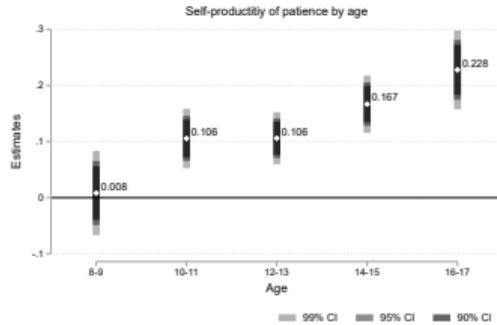


Figure: Patience

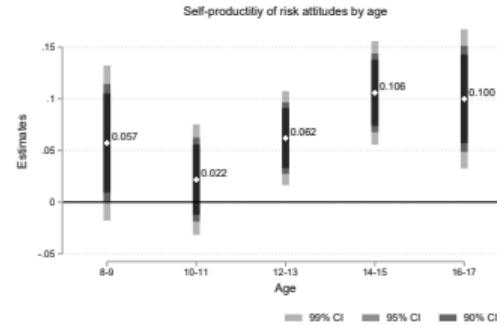


Figure: Risk attitude

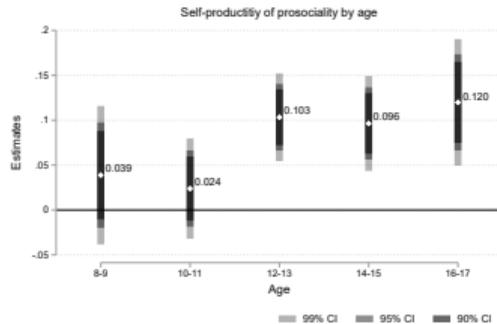


Figure: Prosociality

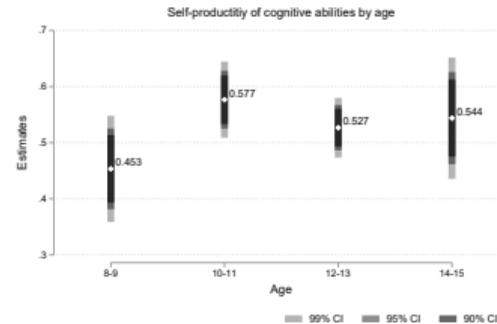


Figure: Cognitive abilities